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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/038,562	03/11/1998	HONGYANG CHAO	63345	8464

7590 12/27/2002

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EXAMINER	
JOHNSON, TIMOTHY M	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 12/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

9

Office Action Summary	Application No. 09/038,562	Applicant(s) Chao et al.
	Examiner T. Johnson	Group Art Unit 2625

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication .
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☒ Responsive to communication(s) filed on 10/7/2.

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 16-21 ~~is~~/are pending in the application.

Of the above claim(s) ______ is/are withdrawn from consideration.

☐ Claim(s) ______ is/are allowed.

☒ Claim(s) 16-21 ~~is~~/are rejected.

☐ Claim(s) ______ is/are objected to.

☐ Claim(s) ______ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on ______ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on ______ is/are objected to by the Examiner.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 11 9(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) ______.

☐ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

*Certified copies not received: ______.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). ______

☐ Interview Summary, PTO-413

☐ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other ______

Office Action Summary

Part III Detailed Action

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chui et al., 5,604,824, Kolarov et al., 6,144,773, and Said et al., An image multiresolution representation for lossless and lossy compression.

For claim 16, image compression system comprising an image source providing an image, the image having pixels, each pixel having a finite number of bits is provided by all of the references, since the pixels would not otherwise exist. In any case, see at least block 12 in Fig. 1 and block 44 in Fig. 2, blocks 18 and 47 in Figs. 3a – 3c (a source of images for the wavelet transform), and at least c. 9, lines 25-65, and the paragraph bridging cols. 10-11 (bits per pixel), of at least Chui et al. Additionally, a source of images of a finite number of bits is also provided by Said et al. in at least the left side of Fig. 1 on page 1304, and bits are explicitly recited in at least the first two full paragraphs in section V on page 1308, as well as throughout their specification. Furthermore, Kolarov also provide for eight or twelve bit per pixel in at least the fourth full paragraph in c. 12.

An image compression system comprising a compressor coupled to the image source, the compressor configured to generate a compressed image is provided by Chui et al. in Fig. 1, blocks 12 and 20, which compresses an "input document" using a wavelet transform; c. 15, lines 33-39 (an image compression system), and based on an integer wavelet transform is further provided by Chui et al. in the abstract, lines 6-10; c. 3, line 64 – c. 4, line 2; c. 4, lines 47-56; c. 23, lines 55-64; c. 25, line 66 – c. 26, line 3; c. 24, lines 49-52; c. 27, lines 44-54; 28, lines 49-58, c. 34, lines 36-47; c. 45, lines 4-15; Fig. 2, blocks 48a, 48b, and 48c; and Fig. 17, blocks 134a, 134b, and 134c. See also at least Fig. 1 of Said et al., which shows an image source and subsequent

wavelet transformation for compression. Furthermore, Kolarov also shows this in at least Fig. 3a, where the source is an image data file, and see also at least Fig. 8.

Chui et al. does not explicitly provide for the well known lifting scheme to obtain integer wavelet transforms, but does provide for the claimed selecting from different integer wavelet transforms as shown in Fig. 2, blocks 48a, 48b, and 48c, from which, one of three wavelet transforms is selected, as noted in c. 15, lines 33-52. Kolarov teaches the lifting scheme for wavelet transforms in at least the fourth full paragraph in c. 5. It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a lifting scheme, as taught by Kolarov, with the integer wavelet transforms of Chui et al. in Fig. 2, blocks 48a, 48b, or 48c, since it provides for at least the advantages that "it does not need to use Fourier transforms"; "is an excellent tool for the construction of second generation wavelets"; and because "the lifting scheme effectively accomplishes the function of the transform step" in compression.

Wherein wavelet coefficients of the integer wavelet transform have a finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image is not explicitly provided by Chui et al. Kolarov provides for a wavelet transform having a same finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image in at least Figs. 3a, and 4a – 4c, particularly, step 326 in Fig. 3a, and c. 19, line 19 – col. 20, line 13. It would've been obvious to one having ordinary skill in the art at the time the invention was made to transform with resulting coefficients having a number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image with the wavelet transforms of Chui et al., since Kolarov provide for the lifting wavelet transform as well as a geometry tree, which has the advantage of representing more than rectangles, and is good for rendering surfaces. Note also that Said et al. provide for the conventionality of the claimed "same finite number of bits" for at least some of the pixels in at least section II on page 1304 below equation 5.

Chui et al. does not explicitly provide for the well correction method to obtain integer wavelet transforms, but does provide for the claimed selecting from different integer wavelet transforms as shown in Fig. 2, blocks 48a, 48b, and 48c, from which, one of three wavelet transforms is selected, as noted in c. 15, lines 33-52. Said et al. teach that it is well known to use

the correction method for integer wavelet transforms starting in the paragraph bridging pages 1303 – 1304 and primarily in section II on page 1304, where the S+P transform used by Said et al. is a correction method (that Said et al. provide for a "correction method" is further indicated by the Applicant's specification on page 38, lines 13-15). It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a correction method, as taught by Said et al., with one of the transforms of Chui et al. in Fig. 2, blocks 48a, 48b, or 48c, since "the S+P transform yields more compression than single-resolution linear predictive coding methods of similar complexity, and can be calculated with a very small computational effort", because Said et al. "propose entropy-coding methods that exploit the multiresolution structure and that can efficiently compress the S+P transformed image for progressive-resolution transmission", because Said et al. "propose an embedded coding method, and show that its rate distortion function is comparable to those of the most efficient lossy compression methods" for "progressive-fidelity transmission", and that the "compression rates obtained with both types of progressive transmission are among the best in the literature", so that "with the proper image transformation, fast inspection schemes can be readily combined with lossless compression, resulting in a negligible penalty in both compression efficiency and coding complexity", as taught by Said in the paragraph bridging pages 1303-1304.

For claim 17, the image compression system of claim 16, wherein the compressor quantizes a wavelet transformed image to produce the compressed image is provided by Chui et al. in block 50 of Fig. 2 and c. 15, lines 53-59.

For claim 18, the image compression system of claim 16, wherein the compressor entropy encodes (e.g. Huffman or arithmetic) a quantized image to produce the compressed image is provided by Chui et al. in c. 15, line 66 – c. 16, line 1 with respect to Fig. 2, block 52, as implemented by apparatus block 64 in Fig. 4, which can be any one of several entropy coders as noted in c. 17, lines 51-65.

For claim 19, the image compression system of claim 16, wherein the compressor performs a color transformation to produce the compressed image is provided by Chui et al. in c.

9, lines 26-44, where the image is color transformed from any one of several different image formats into RGB. Additionally, a color transform can also be construed as the color transform reduction process of Chui et al. in c. 10, line 55 – c. 11, line 2, where a dithering process and mapping colors from a color histogram are certainly color transformations as well, and which transforms provide for further compression as noted in c. 15, lines 10-31.

For claim 20, see the rejection of at least claim 16. An image decompression system comprising a compressed image source providing a compressed image is provided by at least Chui et al. in at least c. 37, lines 20-50. A decompressor coupled to the compressed image source, the decompressor configured to generate a decompressed image based on an integer inverse wavelet transform derived using a technique selected from one of more than one method is provided by Chui et al. where cited above for claim 16, and in c. 4, lines 47- 60; c. 27, lines 55-61; c. 36, lines 60-67; c. 37, line 49 – c. 39, line 22; c. 39, lines 8-22; c. 40, lines 10-12 and lines 48-31; c. 41, lines 41-51; c. 42, lines 27-28; c. 45, lines 4-15; Fig. 17, blocks 134a, 134b, and 134c. The particular technique is selected in at least c. 15, lines 39-52 and the paragraph bridging cols. 38-39, with respect to Fig. 2, blocks 48a, 48b, and 48c (compression), and Fig. 17, blocks 134a, 134b, and 134c (decompression). That the lifting scheme and a correction method are used in a decompression system are obvious for the same reasons noted above for claim 16, of which arguments apply here and are incorporated herein. As a further note on decompression, in the "correction method" provided by Said et al., they recite that the inverse transform, i.e. that which is necessary to obtain the image in the decompression process, is basically the reverse of the transformation in the left col. on page 1305, about the last 16 lines of section II including equation 9, much like the decompression process of Chui et al. "performing substantially the inverse operations of" the compression system, "and as such uses quite similar circuitry to accomplish the same" – last sentence in c. 36 of Chui et al. Similarly, Kolarov, who provides for the conventional and well known lifting scheme noted above, also provide for an inverse transform and decompression in general in accordance with the lifting scheme in at least Fig. 3b, and again, the decompression is basically the reverse of the compression process as noted by Kolarov in at least c. 15, lines 15-25.

Wherein wavelet coefficients of the integer wavelet transform have a finite number of bits that are no greater in number than the highest count for the number of bits for any of the pixels of the image is not explicitly provided by Chui et al., but is provided by Kolarov and suggested by Said et al. as noted above.

For claim 21, see the rejection of at least claim 16, which also applies herein. Additionally, a computer readable medium storing a computer program for directing a computer system to perform image compression, quantizing, entropy coding, and outputting a file is not necessarily provided by Chui et al., who appears to provide for doing so by separate programs. In any case, a computer readable medium storing a computer program for doing these steps is conventional and well known and is provided by Kolarov in at least the four full paragraphs in c. 7, the paragraph bridging cols. 7-8, and Figs. 3a-3b. It would've been obvious to one having ordinary skill in the art at the time the invention was made to implement the method with a computer readable medium with a stored program, since a computer program provided by Kolarov provide for at least the advantage of portability, the ability to upgrade and adapt the program code, and simple and easy storage of the program code in different kinds of memory, and because Kolarov provide for many variations of conventional means for implementing a software solution.

Response to Amendment

3. Applicant's arguments filed October 7, 2002 have been fully considered but they are not persuasive.

The Applicant essentially argues on pages 3-6 of the response that the main feature of the present invention is that wavelet coefficients can be derived from an image of pixels represented by a number of bits with each pixel typically being represented by the same number of bits, and that this central feature of the present invention is not taught by Kolarov.

The Examiner respectfully disagrees. The claims recite that the number of bits in the wavelet coefficients are no greater in number than any of the pixels. Kolarov explicitly discloses 8

to 12 bits per pixel in at least the fourth full paragraph in c. 12, and again explicitly discloses 8 bits per pixel for the wavelet coefficients in at least c. 19, line 25 – c. 20, line 1.

Final

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Johnson whose telephone number is (703) 306-3096, or the Supervisory Patent Examiner, Bhavesh M. Mehta, whose telephone number is (703) 308-5246.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone numbers are (703) 305-4700 or (703) 305-4750, or Customer Service at (703) 306-0377.

The Group Art Unit FAX number is 703-872-9314.

Timothy M. Johnson
TIMOTHY M. JOHNSON
PRIMARY EXAMINER

TJ

Timothy M. Johnson
Patent Examiner
Art Unit 2625
December 26, 2002